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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,622	10/22/2003	Yong Il Doh	8733.232.10-US	4808

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EXAMINER

CULBERT, ROBERTS P

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 06/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/689,622

Applicant(s)

DOH, YONG IL

Examiner

Roberts Culbert

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 10-17, 20 and 21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 10-17, 20 and 21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 4/18/05 have been considered but are not persuasive to overcome the rejections of the previous office action.

Applicant has argued that *"neither Wessells et al. nor Toshima singly or in combination teach or suggest an ultrasonic oscillator generating ultrasonic vibration on multiple surfaces of said substrate, as presently recited in claim 1, or an ultrasonic oscillator generating ultrasonic vibration on a surface of a substrate wherein the ultrasonic vibration emanates from bottom and side surfaces of the etching bath."*

The argument is not persuasive because Wessells et al. teaches that the several ultrasonic oscillators may be placed on the sides or bottom of the etch bath. (Col. 2, Lines 40-41) Moreover, ultrasonic generators produce ultrasound that is transmitted in all directions relative to the substrate regardless of the location in the etch bath. Therefore placement of even a single ultrasonic oscillator in the etch bath produces ultrasonic vibration on multiple surfaces as recited in claim 1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 5, 6, 10, 11, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 3,661,660 to Wessells et al. in view of U.S. Patent 6,146,469 to Toshima.

Wessells et al. teaches an etching bath (10) containing an etchant (12) a holder (60) and ultrasonic generators (14, 16, and 18). Figure 1 illustrates that the ultrasonic generators and holder are located in the interior of the etching bath. Wessells et al. teaches that the ultrasonic generators may be located on the sides or on the bottom of the etch bath. (Col. 2, Lines 40-41)

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Wessells does not teach an indicator displaying a temperature of the etching bath. However, Wessells teaches that the bath is preferably maintained in a specified temperature range using a heater (Col. 3, Lines 7-17)

Toshima teaches an indicator displaying a temperature for monitoring the temperature of a bath where a temperature sensor (110) may either directly display the temperature or may be connected to a temperature display monitor. (Col. 6, Lines 53-60) The temperature sensor (110) directly or indirectly controls a heater (140) to maintain a selected temperature.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the apparatus of Wessells to include the temperature indicator of Toshima.

The motivation to provide the bath of Wessells with the temperature indicator of Toshima is that the temperature indicator may be used to maintain the bath of Wessells in a specified temperature range.

Regarding the limitation of generating ultrasonic vibration on multiple surfaces of the substrate in Claim 1, it is noted that ultrasonic generators produce ultrasound that is transmitted in all directions relative to the substrate regardless of the location in the etch bath. Therefore placement of even a single ultrasonic oscillator in the etch bath inherently produces ultrasonic vibration on multiple surfaces.

Regarding the limitation of generating ultrasonic vibration that emanates from bottom and side surfaces of etching bath in Claim 11, It is noted that Wessells et al. teaches that the ultrasonic generators may be located on the sides or on the bottom of the etch bath. (Col. 2, Lines 40-41) Further, it has been held that mere rearrangement of parts which does not modify the operation of a device is prima facie obvious. See *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975).

Regarding Claims 5 and 6, Toshima does not explicitly use the terms thermometer and thermostat, however Toshima teaches a directly displaying temperature sensor, which describes a thermometer or the equivalent, and the use of a thermocouple, which is also the art-recognized equivalent of a thermometer. Toshima further describes a thermostat or the equivalent by teaching that the temperature sensor senses the temperature changes and then controls a heater indirectly or directly.

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Claims 2, 7, 14 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 3,661,660 to Wessells et al. in view of U.S. Patent 6,146,469 to Toshima as applied above, and in further view of U.S. Patent 4,971,654 to Schnegg et al.

Regarding Claims 2 and 14, as applied above, Wessells in view of Toshima teaches the invention substantially as claimed, but does not teach using hydrofluoric acid as the etchant.

Schnegg et al. teaches using an etchant comprising hydrofluoric acid. (Col. 6, Lines 40-45)

It would have been obvious to one of ordinary skill in the art at the time of invention to use HF as the etchant.

The motivation to use hydrofluoric acid is that it dissolves the oxidation product. (Col. 2, Lines 44-48)

Regarding Claims 7 and 17, as applied above, Wessells in view of Toshima teaches the invention substantially as claimed, but does not teach that the holder supports a plurality of glass substrates.

Schnegg et al. teaches a holder supporting a plurality of substrates. (Col. 6, Lines 48-54)

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the holder of Wessells et al. to support a plurality of substrates.

The motivation to modify the holder to support a plurality of substrates is that it provides for mass production of substrates requiring the same etch processing.

Schnegg et al. does not teach that the substrates are glass, however the apparatus is inherently capable of performing etch processing on glass substrates.

Claims 3, 4, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 3,661,660 to Wessells et al. in view of U.S. Patent 6,146,469 to Toshima as applied above, and in further view of U.S. Patent 4,971,654 to Schnegg et al. and U.S. Patent 3,556,161 to Roberts.

As applied above, Wessells et al. in view of Toshima teaches the invention substantially as claimed, but does not teach forming the holder from an acid resistant material such as polytetrafluoroethylene.

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Schnegg et al. teaches a suitable holder for an etch bath containing hydrofluoric acid is made from polytetrafluoroethylene. (Col. 6, Lines 40-54)

Roberts teaches that polytetrafluoroethylene is known to be resistant to high temperatures and virtually all chemical agents including strong acids such as hydrofluoric acid. (Col. 2, Lines 48-51)

In view of the teachings of Schnegg et al. and Roberts, It would have been obvious to one of ordinary skill in the art at the time of invention to form the holder of Wessells et al. in view of Toshima from polytetrafluoroethylene.

The motivation to form the holder of Shin et al. from polytetrafluoroethylene is to provide a holder that resists the solvents and temperatures that are used in etching processes.

Claims 2, 7, 12-14 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 3,661,660 to Wessells et al. in view of U.S. Patent 6,146,469 to Toshima and in further view of GB 2323334 A to Shin et al.

Regarding Claims 12 and 13, as applied above, Wessells in view of Toshima teaches the invention substantially as claimed, but does not teach a control unit for receiving a temperature signal and generating an etching termination (end point) signal.

Shin et al. teaches an etching bath control unit (Figure 2) for receiving a temperature signal from a temperature sensor (60) and generating an etching termination (end point) signal when the temperature signal indicates an etching termination temperature (Page 12, Lines 8-10). Therefore, the control unit determines the etching termination temperature from the temperature-indicating signal.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the apparatus of Wessells to include the control unit of Shin et al.

The motivation for providing the control unit is that it provides end point determination for an etching bath process based on etchant temperature.

Regarding Claims 2, 7, 14 and 17, as applied above, Wessells in view of Toshima teaches the invention substantially as claimed, but does not teach using hydrofluoric acid as the etchant or that the holder supports a plurality of glass substrates

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Shin et al. teaches using hydrofluoric acid to etch a plurality of glass substrates (Page 2, Lines 17-20 and Page 4, Lines 8-10)

It would have been obvious to one of ordinary skill in the art at the time of invention to use HF as the etchant and to modify the holder of Wessells et al. to support a plurality of substrates.

The motivation to use hydrofluoric acid, and to provide support for a plurality of substrates, is to mass-produce LCD substrates consistently, as suggested by Shin et al. (Page 6, Lines 1-5)

Claims 1, 2, 5-7, 10-14, 17, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2323334 A to Shin et al. in view of JP 11006081 A to Takeuchi et al. and JP 55130839 A to Nakayama et al.

Shin et al. teaches an etching bath (20) containing an etchant (hydrofluoric acid), a holder for supporting a plurality of glass substrates (Page 2, Lines 17-20 and Page 3, Line 23), a temperature sensor (60) and a control unit (CPU) for generating an etching termination (end point) signal when the temperature signal indicates an etching termination temperature (Page 12, Lines 8-10).

Shin et al does not teach an indicator displaying a temperature of the etching bath. Takeuchi et al. teaches an indicator (44) displaying a temperature of an etching liquid that is measured with a temperature detector. (See provided Abstract and Figure 1 of Takeuchi et al.)

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the apparatus of Shin et al. to include a temperature indicator displaying a temperature of the etching liquid in the etching bath.

The motivation to provide the etching bath of Shin et al with a temperature indicator displaying a temperature of the etching liquid is to provide the temperature detected by a temperature sensor to be used in controlling an etching process such as determining the endpoint of the etching process as taught by Shin et al.

Shin et al. does not teach an ultrasonic oscillator located in the interior of the etching bath.

Nakayama et al. teaches an ultrasonic oscillator located in the interior of the etching bath. (Reference is made to included Abstract)

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It would have been obvious to one of ordinary skill in the art at the time of invention to modify the apparatus of Shin et al. to include the ultrasonic generators of Nakayama et al.

The motivation to provide the etching bath of Shin et al. with the ultrasonic generators of Nakayama et al. is to enhance the stirring effect imparted to the etchant at the substrate surface, and to thereby improve etching uniformity.

Claims 3, 4, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2323334 A to Shin et al. in view of JP 11006081 A to Takeuchi et al. and JP 55130839 A to Nakayama et al. as applied above, and in further view of U.S. Patent 4,971,654 to Schnegg et al. and U.S. Patent 3,556,161 to Roberts.

As applied above, Shin et al. in view of JP 11006081 A. and JP 55130839 A to Nakayama et al. teaches the invention substantially as claimed, but does not teach forming the holder from an acid resistant material such as polytetrafluoroethylene.

Schnegg et al. teaches a suitable holder for an etch bath containing hydrofluoric acid is made from polytetrafluoroethylene. (Col. 6, Lines 40-54)

Roberts teaches that polytetrafluoroethylene is known to be resistant to high temperatures and virtually all chemical agents including strong acids such as hydrofluoric acid. (Col. 2, Lines 48-51)

In view of the teachings of Schnegg et al. and Roberts, It would have been obvious to one of ordinary skill in the art at the time of invention to form the holder of Shin et al. from polytetrafluoroethylene.

The motivation to form the holder of Shin et al. from polytetrafluoroethylene is to provide a holder that resists the etchant of Shin et al. (hydrofluoric acid)

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (571) 272-1433. The examiner can normally be reached on Monday-Friday (8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

R. Culbert



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SUPERVISORY PATENT EXAMINER